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TECHNICAL REPORT AHS - 5

APRIL 1983

EQUITABLE SELECTION AND REPRESENTATIVENESS

OF THE FIRST ADVANCED MEDICAL SPECIALIST 91B30 CLASS

INDIVIDUAL TRAINING DIVISION
DIRECTORATE OF TRAINING DEVELOPMENT
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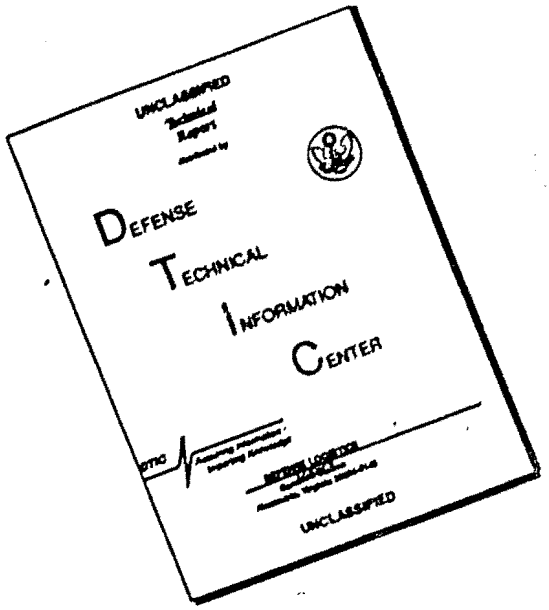

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The U. S. Army Medical Department has recently developed an advanced medical training course for non-commissioned officers in the 91B Medical Specialist military occupational specialty (MOS). This report documents the procedures employed by the Academy of Health Sciences in the selection of enlisted personnel for the first 91B30 Advanced Medical Specialist training course at Ft. Sam Houston, Texas.

Two primary concerns were identified in screening applications received for

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the initial course. First, selection was to be equitable for both male and female medics in the pay grades of E-4 and E-5 to comply with equal opportunity requirements. The second issue dealt with the requirement that the initial class must be representative of the E-4 and E-5 medical specialist population. Since developed training and test materials would be validated during the first class, it was crucial that the full range of talent within the MOS be represented in the first class. If materials were validated on an "elite" group of students, future classes with a lesser quality background would not be expected to perform as well in the course, and attrition would be expected to increase over time. Conversely, if the validation class consisted of less talented students, future classes with a mixture of abilities would not be challenged to do their best during the training experience since student evaluations would be tied to minimal abilities and acquired skills.

Two assessment studies were performed prior to the inauguration of the first 91B30 course. The first study examined the results from an AHS board for the selection of 40 students from a pool of 61 applicants. Correlation and regression analyses of the student selection decisions revealed that the board members considered the factors of leadership and field unit assignments to be most desirable in the selection of student candidates. In addition, results indicated that gender, civilian education, and emergency medical training had little or no effect upon the final selection outcomes. These findings provided evidence that student selection was accomplished in an equitable fashion, and that the subsequent validation of the 91B30 Advanced Medical training course would be "gender-free" and would be based upon Army experience rather than upon civilian acquired skills and education.

The second study compared the selected student group with the 91B E-4 and E-5 population as recorded on the Enlisted Master File personnel system maintained at the Soldier Support Center at Ft. Benjamin Harrison, IN. Results revealed that the first student class was representative of the 91B population in regard to education grade equivalent scores, age, years of service, and gender.

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April 1983

Equitable Selection and Representativeness of the First Advanced Medical Specialist 91B30 Class

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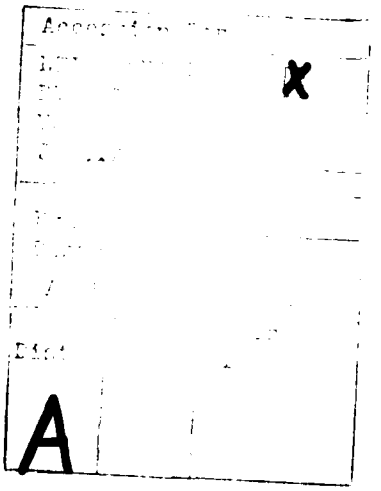

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Background

The purpose of this paper is to examine two key issues in regard to the first 91B30 Advanced Medical Specialist training course at the Academy of Health Sciences, Ft. Sam Houston, Texas. The first issue involves a study of the Academy's decisions in reference to the applicant pool of potential students to assure that an equitable student selection took place. This is particularly important since this first selection action sets a precedent for future 91B30 selections. The second related issue involves a comparison of the first 91B30 student class (n = 40) with the 91B E-4 and E-5 population from which the class was drawn. This second study was conducted to determine if the first selected class is representative of the full range of academic talent in the 91B E-4 and E-5 CMF. Because the first class of students is used to validate the course materials, student background characteristics could well influence the validation process. If an "elite" group of students served as the validating group for course materials, one could expect them to do quite well. However, the course would not be validated upon the full range of talent available in the 91B population. Therefore future 91B30 classes with a lesser quality of background would not do as well in the course and course attrition would be expected to increase markedly. In addition, the role of gender is also considered in both studies. For the first issue gender is examined for opportunity concerns to assure that student selection was relatively "gender-free". The second issue is examined for joint gender and academic ability concerns, since the bulk of the educational literature indicates that females traditionally do better in academic environments than do their male counterparts.

To meet the objectives outlined above two separate studies were conducted. Figure 1 displays the domain from which data for the two studies were drawn. The first study will concentrate on the linkage between the N = 61 applicant pool and the final 40 students selected for the first 91B course validation.

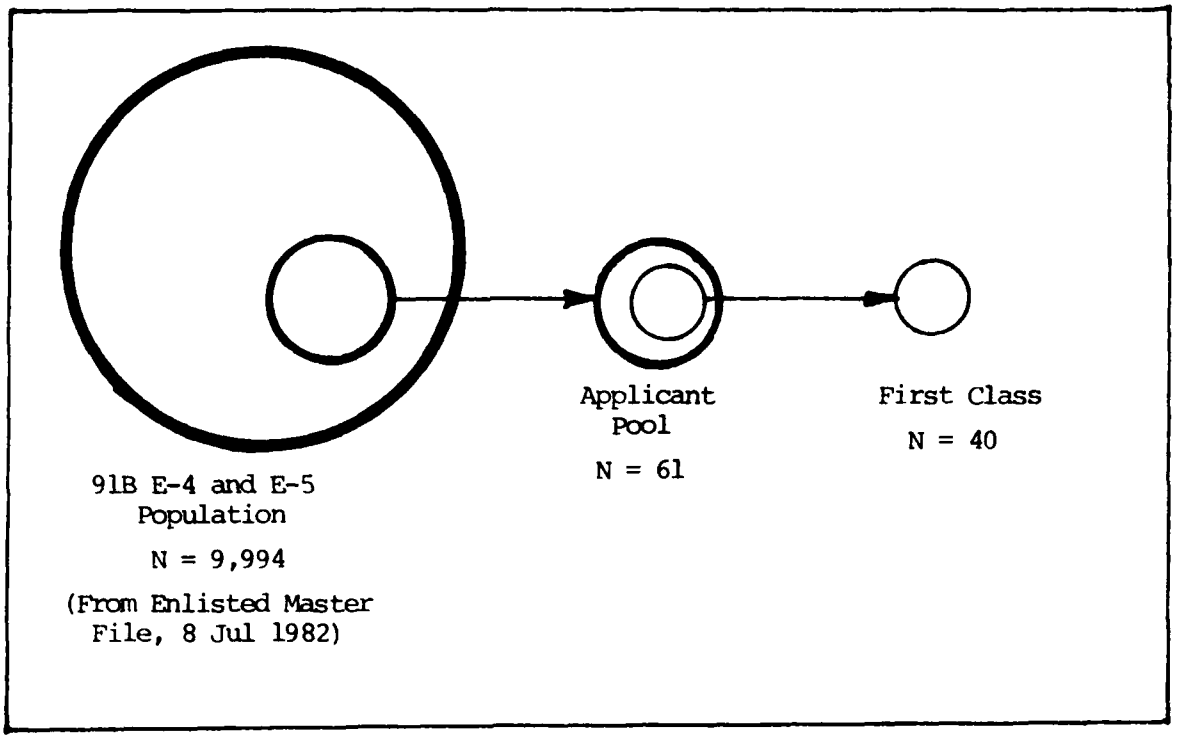

Figure 1. Diagram of the 91B E-4 and E-5 population, the applicant pool, and the first selected class for the 91B30 Advanced Medical Specialist course at AHS.

The second study will compare specific characteristics of the first class with characteristics of the entire population to assess the extent to which the first class is representative of future classes which will be drawn from the population.

Study I

Assessment of Selection Procedures

Sixty-one applications were received in November from potential 91B30 students. Appendix 1 contains a description of the applicant pool and

and specific recommendations for student selection which considered both range of talent and gender concerns. Composite scores reflecting applicant experience factors were calculated to determine the range of talent distribution among the potential 91B30 students. Results indicated that the range of talent resident in the applicant pool was normally distributed ranging from scores of 1 to 10 on a scale of 0 to 15 possible points.

On 15 Nov 82 an Academy student selection board was convened to decide which of the 61 applicants would be entered into the first 91B30 course. Five Academy board members independently assigned a rating of 0 to 5 for each candidate. The board decisions were then averaged to produce a rating for each of the 61 applicants. While board members informally used the information contained in each applicant's file, their decisions were made without knowledge of the composite experience scores calculated on the 0 to 15 point scale. The board then selected 40 students and 4 alternates out of the 61 applicants. (See Appendix 2 for a description of the Academy student selection board actions). The selection board attempted to select students throughout the range of assigned ratings (0 to 5) and to ensure that an equitable number of females was selected also. Based on the final board decisions a student selection variable was generated which coded each student 1 if selected or 0 if nonselected. This variable was then used as the criterion to determine the degree to which various applicant experience factors influenced the final selection process.

Variables for gender (coded 1 if male, 0 if female) and five other experience factors were developed for the applicant pool. In addition a composite score variable was also generated. Table 1 presents the means and standard deviations for the student selection criterion and the gender and

experience variables. As shown, the average of the student selection variable (Y) was .656. This may be interpreted as the proportion of students selected out of the 61 applicants, i.e. 40 out of 61 applicants were selected (.656) or 65.60% were coded as 1 = selected. Likewise, there were 47 males in the applicant pool of 61 (.770) or 77.00% were coded as 1 = male. On the average, based on

Table 1

Means and Standard Deviations For
Student Selection Criterion Variable and Various Predictor Variables

Variable	Symbol	Mean	Standard Deviation
Student Selection (Coded 1 if selected, 0 if nonselected)	Y	.656	.475
Gender (Coded 1 if male, 0 if female)	G	.770	.421
Experience Factors[a]			
EMT training	E	.393	.774
TOE Assignments	T1	1.803	.920
TDA Assignments	T2	1.492	.820
Civilian Education	C	.213	.448
Leadership training	L	1.525	1.080
Composite Score	CS	4.869	1.996

Note: N = 61 applicants

[a]Experience factors ranged from values of 0 to 3. The composite score was computed as the sum of the five experience factors and could range from 0 to 15.

the 0 to 3 point scales for experience factors, few applicants had received EMT or advanced EMT training, had served in more types of TOE units (FORSCOM, OCONUS, RDF) than in TDA units (TMC/DISP, ER/Ambulance), had not completed much academic work beyond high school, but had received some form of leadership training.

To determine the degree of association among the student selection criterion and the various predictor variables a correlation matrix was constructed as shown in Table 2. Of primary interest here is the fact that the student

Table 2

Inter-correlation Matrix For Student Selection Criterion, Gender, and Various Experience Factor Variables

Variable	Symbol	Variable[a]							
		Y	G	E	T1	T2	C	L	CS
Student Selection	Y	1.0	.10	.09	.12	-.39**	.12	.27*	.11
Gender	G		1.0	.14	.23	.05	.12	.16	.30**
EMT Training	E			1.0	.26*	-.12	.15	.08	.51**
TOE	T1				1.0	-.23	.08	.21	.60**
TDA	T2					1.0	.14	-.08	.25**
Civilian Education	C						1.0	-.05	.33**
Leadership Training	L							1.0	.65**
Composite Score	CS								1.0

[a]Correlations significantly different from zero (59 degrees of freedom), *$p<.05$, **$p<.01$. N = 61.

selection criterion is not correlated highly with the composite score (r = .11). This may be interpreted as an indication that applicants with low composite scores were equally likely to be selected as those applicants with high composite scores. As would be expected the various experience variables correlated significantly with the composite score of which each factor was an additive part. Interestingly enough, the significant correlation between gender and composite score indicated that on the average,males tended to have higher experience scores overall than did females. Also of interest is the fact that applicants with EMT training tended to be associated with TOE rather than with TDA units (r = .26 versus r = -.12).

Another correlation of interest involves the student selection criterion and two experience variables, viz., TDA assignments and leadership training. For TDA assignments, the more experience applicants had in TDA units, the less likely they were to be selected for the 91B30 class. This is demonstrated by the statistically significant negative correlation of $r = -.39$. However, in the opposite direction, those applicants with higher levels of leadership training tended to be selected more often than applicants with lower levels of leadership training $r = .27$. These findings are in line with the philosophy of the 91B30 advanced medical specialist course in that the training is directed toward enhancing trauma and medical/surgical skills for the combat medical non-commissioned officer/leader.

Finally, of note is the fact that the correlation between the student selection criterion and gender appeared to be attenuated ($r = .10$) indicating no significant trend in the selection of males over females within the 91B applicant pool.

A series of multiple linear regression equations was constructed in order to assess the specific effects that gender and the experience factors had upon the final student selection decisions of the AHS board. These equations in turn were used to test specific hypotheses concerning the contribution of specific variables to the student selection outcome from the AHS board. Table 3 presents the fundamental forms of the multiple linear regression equations used for this analysis and includes the number of linearly independent predictor vectors comprising the parameter estimates and the resultant multiple coefficient of determination (R^2) for each equation (Ward & Jennings, 1972).

The first equation, (A), includes both gender and the five experience factors. The resultant R^2 indicates that some 25.39% of the variance in the student selection criterion may be explained by knowledge of gender and experience.

Table 3

Multiple Linear Regression Equations
Developed For Hypothesis Tests

Equation	Symbolic Form[a]	NLIPV[b]	$\underline{R}^2$
A	$Y = w_0U + w_1G + w_2E + w_3T1 + w_4T2 + w_5C + w_6L$	7	.25391
B	$Y = w_0U + w_1E + w_2T1 + w_3T2 + w_4C + w_5L$	6	.24965
C	$Y = w_0U + w_1E + w_2T1 + w_3T2 + w_4L$	5	.21399
D	$Y = w_0U + w_1E + w_2T1 + w_3T2$	4	.15579
E	$Y = w_0U + w_1E + w_2L$	3	.07986
F	$Y = w_0U + w_1T1 + w_2T2 + w_3L$	4	.21291

Note: N = 61 applicants for the 91B30 course.

[a] Y is the selection criterion coded 1 if select, 0 if nonselect. U is an unit vector for assigning a regression constant to the equation. See Table 3 for definitions of other predictor variables. w_0 through w_i, i = 1 to n are the raw least squares regression coefficients for the equations.

[b] NLIPV = Number of linearly independent predictor vectors

The remainder of the equations may be interpreted in a similar fashion by multiplying the $\underline{R}^2$ value by 100 to obtain the percent of variance accounted for in the selection decisions by various sets of predictor variables.

As shown in the table above, Equation B contains all experience variables but excludes the information regarding gender. Equation C excludes gender and information concerning civilian education, and so forth. Comparisons of the level of prediction for equations containing specific variables may be made with equations which do not contain specific variables or types of information. The intent of hypothesis testing for variable effects covered below is to isolate

specific types of variables as contributing to the "policy" of the Academy selection board, and to determine which of the variables was not highly associated with the board's decision. The value of conducting tests of hypotheses in this fashion is that the joint effects of remaining variables may be held constant, or controlled for in the assessment of a specific variable of interest. This form of hypothesis testing is an accepted and standard means of investigative research in the social sciences and is routinely applied to personnel selection studies (see Kerlinger & Pedhazur, Multiple Regression in Behavioral Research, Holt, Rinehart, & Winston, 1973; and Guilford & Fruchter, Fundamental Statistics in Psychology and Education, Mc-Graw-Hill, 1973 ---- topics dealing with discriminant analysis and functions).

Table 4 presents the formal hypothesis testing procedure used in the study.

Table 4

Significance Test Results for Comparative Hypotheses Assessing Specific Student Selection Effects While Holding Constant Remaining Variables

Hypothesis	Equations Compared [a]	R^2_{full}	R^2_{rest}	df_1	df_2	F[b]
Substantive prediction	A vs. Zero	.25391	0	6	54	3.06*
Gender effects	A vs. B	.25391	.24965	1	54	.31 n/s
Civ. Education effects	B vs. C	.24965	.21399	1	55	2.16 n/s
Leadership effects	C vs. D	.21399	.15579	1	56	4.15*
Unit Assignment effects	C vs. E	.21399	.07986	2	56	4.78*
EMT training effects	C vs. F	.21399	.21291	1	56	.08 n/s
Final model prediction	F vs. Zero	.21291	0	3	57	5.14**

Note: N = 61 applicants

[a] See Table 4 for equation form

[b] Levels of significance; *$p<.05$, **$p<.01$, n/s = nonsignificant.

Each of the hypotheses will be covered separately. First, to insure that the level of prediction was adequate to account for any of the variance in the Academy board's decisions, the full regression equation (A) was tested against a multiple correlation of zero with the following F ratio test:

$$F = \frac{(R^2_{\text{full equation}} - R^2_{\text{restricted equation}}) / df_1}{(1.0 - R^2_{\text{full equation}}) / df_2}$$

where R^2_{full} is the coefficient associated with the equation containing all variables, $R^2_{restricted}$ is the coefficient associated with the equation excluding the variable which is being assessed, df_1 is the $NLIPV_{full}$ equation minus the $NLIPV_{restricted}$ equation, and df_2 is $(N - NLIPV_{full})$. In standard acceptable terminology as used in statistical analyses, df_1 is the degrees of freedom associated with the numerator of the F ratio, and df_2 is the degrees of freedom associated with the denominator of the F ratio. The remainder of the hypotheses were tested using a similar procedure.

The first hypothesis test revealed that the information contained in the predictor set was statistically and significantly related to the student selection decisions of the Academy board. This finding indicates that we can "account" for a significant amount of the variability in decision making by the board regarding their choice of students for the 91B30 course. The next question which follows from this finding is "which of the specific variables were most highly associated with the board's decisions?".

Of several possible hypotheses to entertain, the one of most interest regards gender effects. In simple terms: to what degree did gender influence the AHS board's decisions on whether an applicant should be selected or not selected for advanced medical training? The F ratio for this hypothesis was

.308, a nonsignificant finding. This result indicates that no relationship existed between the gender of the applicant and the probability that the applicant would be selected for training. Therefore, the selection of students for the 91B30 course was "gender-free", in that one sex was not favored over the other in being selected for the course.

The third hypothesis examined the effects due to the level of civilian education upon the criterion of student selection. To maintain the power to detect variable effects, whenever a specific variable was found to not be related to the student selection criterion, that variable was then removed from the equation before proceeding with the next hypothesis test. In this case gender effects did not emerge, therefore equation B is used as the full model equation in testing for effects due to civilian education level (see Table 4). Again, no evidence could be found for differential selection of students on the basis of civilian educational attainment ($F = 2.61$, a nonsignificant finding). Based on this result, the variable of civilian education was removed from the full equation and further hypothesis tests were conducted for the remaining variables.

For the next hypothesis; leadership training effects; a substantial difference was found for those applicants who had higher experience levels versus applicants who had lower experience levels, with $F\ (1,56) = 4.15$, $p < .05$. Evidently AHS board members favored applicants with more leadership training. The odds that a finding of this magnitude could have arisen by chance alone are less than 5 in 100. Therefore we may conclude that part of the AHS board's policy definitely included a consideration of leadership training. The leadership variable was maintained in the full equation (C) for further tests of the remaining variables.

The fifth hypothesis dealt with effects due to previous unit assignments. For this test, both the TOE and TDA variables were removed from the full equation (C) to determine their impact upon the level of prediction for student selection. As shown in Table 4, a drastic reduction occurred for the variance accounted for; dropping from 21.40% to 7.99% ($\underline{R}^2_{full}$ = .21399; $\underline{R}^2_{restricted}$ = .07986). Both variables were removed at the same time because some applicants had <u>both</u> TOE and TDA experience. Again, as for leadership training effects, these results indicated that previous and current assignments of the students did impact upon the AHS board's selection decisions. Unit assignment effects were significant in the selection process, therefore these two variables were maintained in the full equation for the next hypothesis test.

The final experience variable to be considered was Emergency Medical Technician training. The $\underline{F}$ ratio for this variable restricted from the full equation failed to approach significance. Therefore this finding provides evidence for the conclusion that students were not selected on the basis of EMT or any advanced EMT training.

The last hypothesis to be tested concerned the final regression equation which contained the variables of 1) leadership training, 2) TOE assignments, and 3) TDA assignments. This test was conducted to assure that the final variance accounted for in the selection criterion (21.22%) was still at a viable level of prediction. Results indicated that these three variables by themselves were highly associated with the student selection decisions, with $\underline{F}(3,57) = 5.14$, $\underline{p} < .01$. This final equation is expressive of the "policy" of the AHS student selction board; and also indicates by the absence of gender, civilian education, and EMT training, that effects due to these last three considerations were <u>not</u> part of the selection policy.

In summary, study 1 demonstrated that the selection of students for the 91B30 class was made on the basis of leadership training and previous and current unit assignments in TOE and TDA units. The numerical version of this selection equation is given below:

$$Y = .89U - .01\ TOE - .22\ TDA + .10\ Leadership$$

As clearly indicated, leadership made the most dramatic impact upon the selection decisions when other variables were controlled for in the equation. Further, those candidates with more TDA experience were less likely to be selected as students by the AHS board. The power of the equation to predict the AHS board's policy can best be demonstrated by the following simple example which compares two "hypothetical" applicants.

Applicant 1 has had a TOE overseas tour in Korea (OCONUS value = 2), no TDA assignments (value = 0), and has completed Primary Leadership training (PLC value = 2). Applicant 2 has had one TOE assignment (FORSCOM value = 1), has had TDA dispensary duty (DISP value = 2), and no leadership training whatsoever (value = 0). Plugging these variable values into the equation above we can calculate the predicted score (Y) which would more likely than not be assigned by the AHS board:

Applicant 1 $Y = .89\ (1) - .01(2) - .22(0) + .10(2) = .97$

Applicant 2 $Y = .89\ (1) - .01(1) - .22(2) + .10(0) = .44$

The predicted score may be regarded as a probability for selection. Therefore the odds for selection for applicant 1 are 97 out of 100, while the odds of selection for applicant 2 are less than 50 out of 100. Notice that this "policy" applies regardless of gender, civilian education level, or EMT training.

The results of study 1 demonstrate that the selection of students for the 91B30 course was done in a systematic fashion and did not include bias due to gender, civilian education level, or emergency medical training.

These findings are important because they support the contention that the first 91B30 class used in validation of the 91B30 Advanced Medical Specialist course was selected on the basis of U. S. Army experience and leadership experiences. More likely than not this "policy" will prevail for future class selections. Perhaps more importantly, these findings demonstrate that the first 91B30 class was not an "elite" academic group destined to succeed on the basis of educational attainment or previous advanced medical training. Nor was the first 91B30 class selected to favor males over females or vice versa as shown by the results of the data analysis above. In summary, STUDENT SELECTION FROM THE APPLICANT POOL WAS DONE IN A SYSTEMATIC AND EQUITABLE MANNER AND MET THE CONCERNS AND NEEDS OF THE ACADEMY AND THE ARMY MEDICAL DEPARTMENT.

Study II
Assessment of Representativeness

The second study was conducted to determine the extent to which the 91B30 class of 40 students was representative of the 91B E-4 and E-5 population (see Figure 1). The primary concern here centers on validation of the 91B30 course. Obviously the course should ideally be designed to meet the training needs of most of the E-5 and E-4 promotable non-commissioned officers within the 91B MOS.

To provide a comparison of the student class and the population, data were extracted from the Enlisted Master File at the Soldier Support Center, Ft. Benjamin Harrison, Indiana. Table 5 was constructed to display certain biographical and ability test score data. Information is arrayed by military grade and by variable of interest. As shown, females constitute approximately 16% of the population of 9,994 soldiers. Averages for age and for years of service are also reported for both E-4 and E-5 subsets of the population.

Table 5

91B Population Parameters From The Enlisted Master File[a] (E-4 E-5)

Variable	E-4 (SP4)	E-5 (SP5)	Total	Percent
Male	5,146	3,220	8,366	83.17
Female	1,215	413	1,628	16.29
	6,361	3,633	9,994	100.00
Average age	23.0	27.0		
Average years of military service	3.0	7.0		
Average General-Technical (GT) Score[b]	105.0	111.0		
(N)	(6,249)	(3,570)	(9,819)	
Average GT Score Converted to Grade Level Equivalent	10.05	10.35		

[a]Data as of 8 Jul 82 from Soldier Support Center, Ft. Benjamin Harrison, IN

[b]From Armed Services Vocational Aptitude Battery (ASVAB) forms 6 and 7

Note: Average GT scores were converted to grade level equivalents with the Army Research Institute (ARI) conversion chart supplied by SSC.

Also reported are the average General Technical scores from the ASVAB. The GT score is formed from a composite of word knowledge and arithmetic reasoning. Scores were not available on each of the 9,994 soldiers, however scores were available for 9,819 or nearly all of the population. The GT scores were then converted to grade level equivalents using a conversion chart developed by ARI. The final grade level equivalent for E-4 was 10.05 approximately at the sophomore high school level. Final grade level for E-5 was only slightly higher

at 10.35 -- also sophomore high school level. In order to form a total grade level equivalent for both subsets, a weighted average was constructed as follows:

$$\text{Weighted average grade level equivalent} = \frac{6,249\ (10.05) + 3,570\ (10.35)}{9,819} = 10.159$$

(sophomore H.S. level)

Similar computations were performed for the weighted average age and weighted average years of service based upon 9,994 cases available in the population:

$$\text{Weighted average age} = \frac{6,361\ (23.0) + 3,633\ (27.0)}{9,994} = 24.45 \text{ years old}$$

$$\text{Weighted average years of service} = \frac{6,361\ (3.0) + 3,633\ (7.0)}{9,994} = 4.45 \text{ years}$$

It should be observed that these weighted averages provide an estimate of the population parameters. These estimates are probably slightly lower than the targeted population of potential applicants for the 91B30 course since the computations include individuals who only recently were promoted to E-4 (SP4) as of 8 Jul 1982. However, these data do provide a very stable estimate of the population parameters which may be used as a baseline to compare the 91B30 class characteristics against.

Students for the 91B30 class were administered the Test of Adult Basic Education (TABE) on 14 Mar 1983 by the Army Education Center, Ft. Sam Houston, Texas. Results of this test administration are Appendix III. The TABE provides grade equivalent skill levels in reading, language, spelling and mathematics, and also provides a grade equivalent skill level for the entire battery. These ability areas are roughly the same as those covered by the GT scores from the ASVAB (see above). Student ages and years of military service are also listed

at inclosure 3. Means and standard deviations were calculated to determine the average and standard deviation values for TABE grade equivalent skill level, age, and time in service. Table 6 presents a comparison of the student class averages and standard deviations with the weighted average population characteristics for 91B E-4 and E-5's.

Table 6
Comparison of The First 91B30 Selected Student Class
With The 91B E-4 and E-5 Population

Comparison	91B E-4 E-5 Population	91B30 Student Class Mean	Std. Dev.
Equivalent Grade Level	10.159	10.0025	1.89
Age in years	24.45	24.85	3.36
Time in Service (in years)	4.45	5.65	2.14

In order to provide a visual comparison of the population with the selected student class, the grade level distribution of students' scores was superimposed upon the known population grade equivalent parameter value (see Figure 2). Standard deviation values were used to display variability and are indicated as standard scores within the distribution (Z scores). As shown in the figure there is very little difference between the grade level equivalent of the population and that of the selected student class. While the student class equivalent falls slightly below that of the population, tne difference is only .1565 grade equivalent points, or a departure of only 1.54% from the population parameter. These results indicate that the selected student class was indeed representative of the population in terms of grade

level ability. The implication to be drawn from this finding is that future classes selected for the 91B30 course will be expected to have roughly the same level of word knowledge and arithmetic reasoning as the first student class. In terms of validation, those course topics which proved difficult for the first class would be expected to also be difficult for future classes, and those topics which first class students mastered easily would be expected to be mastered by future classes as well.

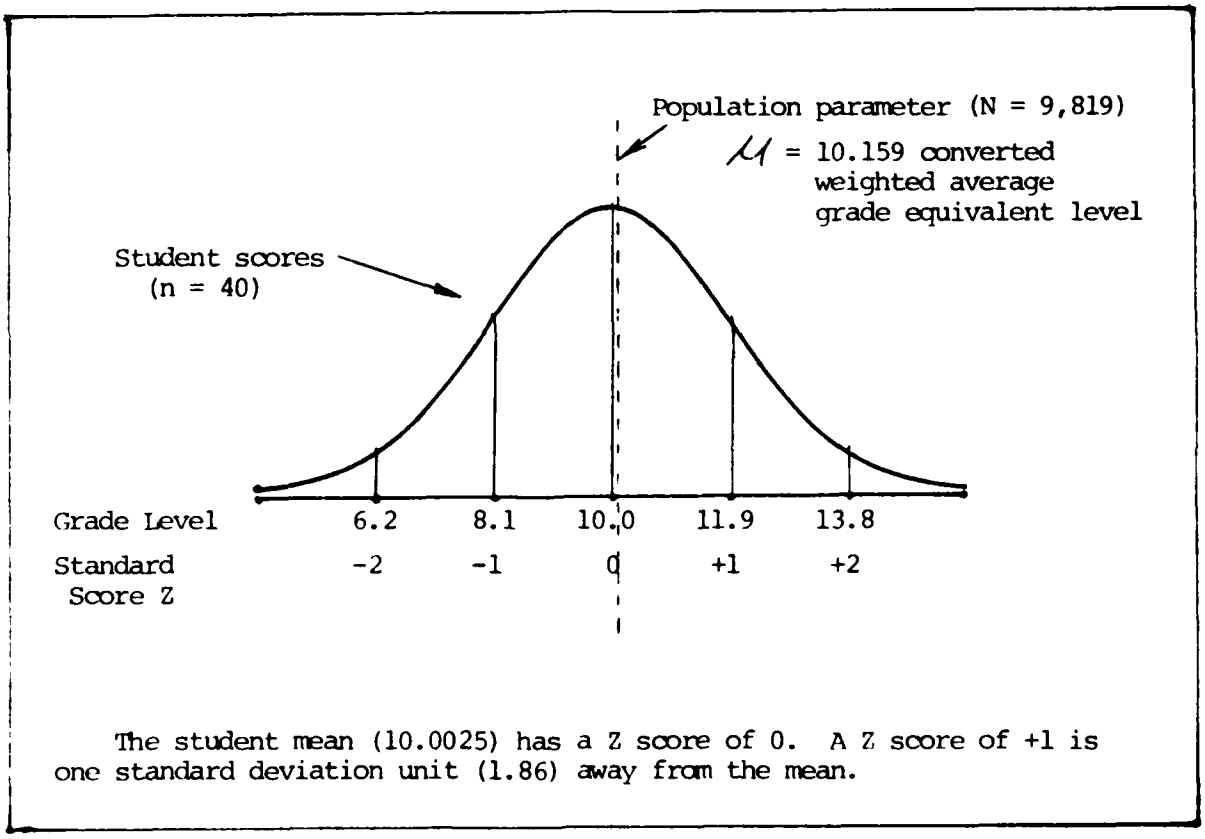

Figure 2. Distribution of students' TABE grade equivalent scores imposed upon the population parameter (mu) for grade level.

While grade level would have the most impact upon representativeness and in turn validation, to some extent age and time in service could also influence the validation process -- though not to the same degree as ability. Distributions for age and time in service were also prepared and are presented in Figures 3 and 4.

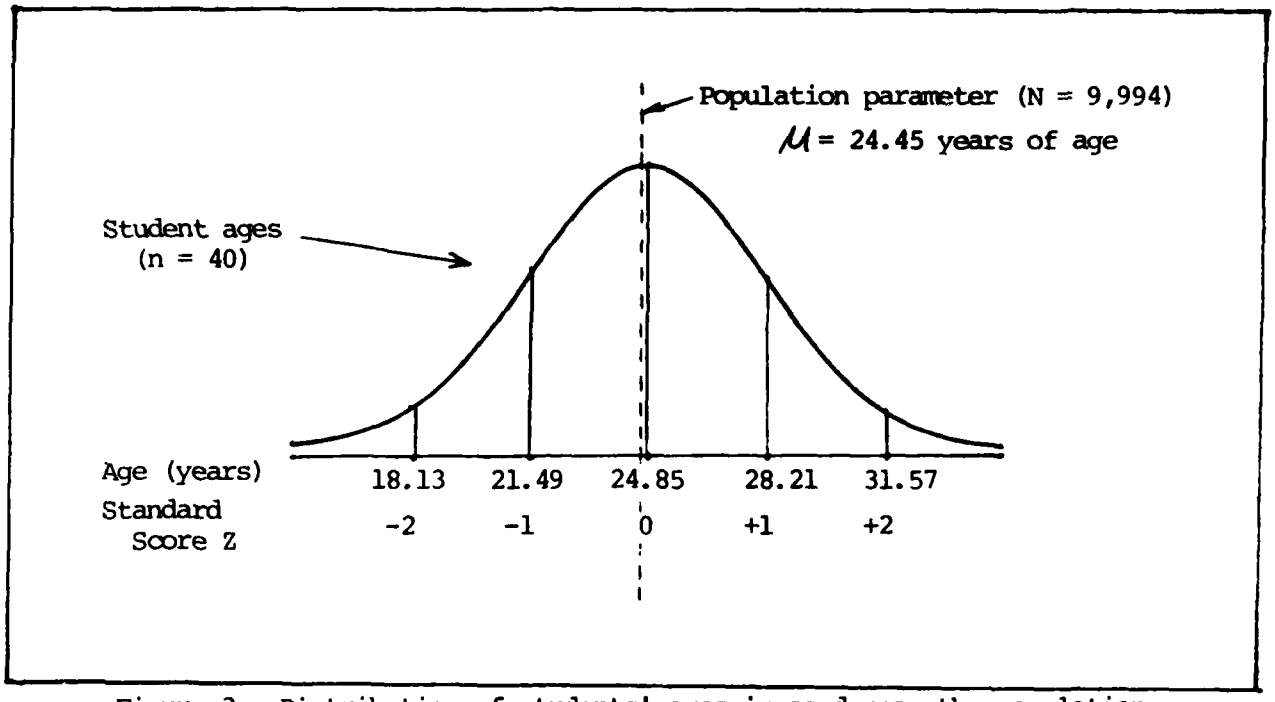

Figure 3. Distribution of students' ages imposed upon the population parameter (mu) for age in the 91B E-4 and E-5 MOS.

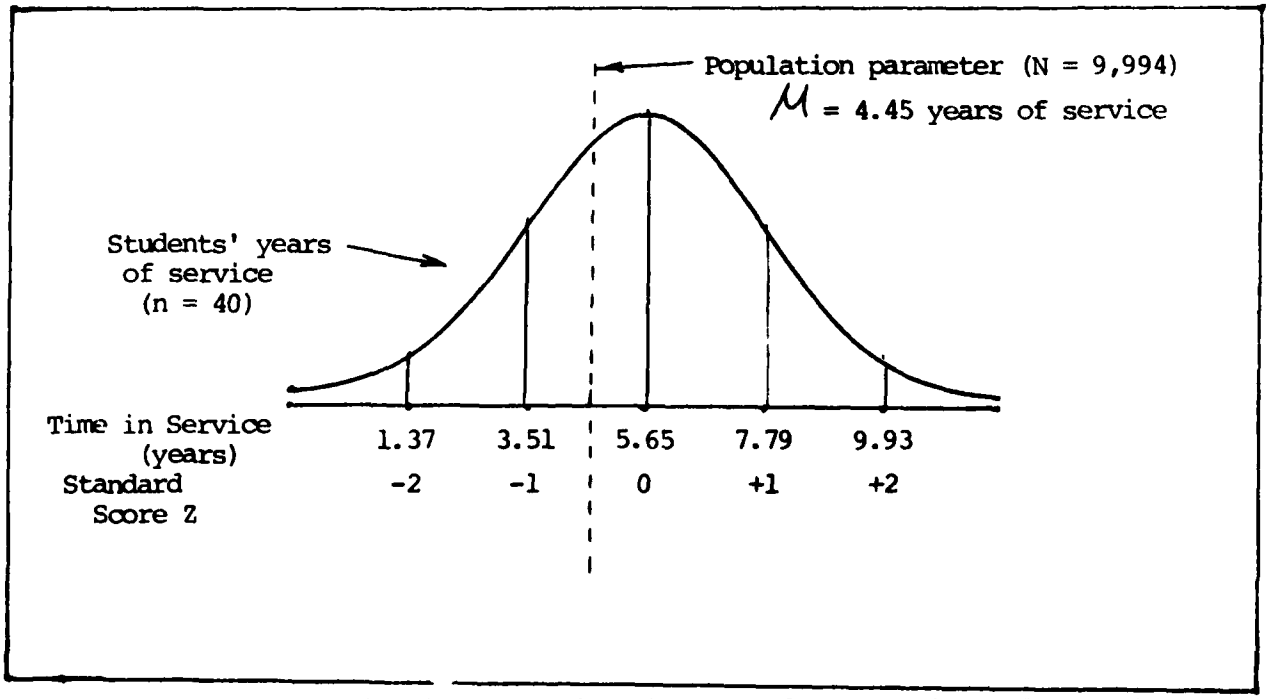

Figure 4. Distribution of students' years of service imposed upon the known population parameter for time in service (mu) for 91B E-4's and E-5's.

As shown for age, the class is again very close to the population parameter known for all 91B E-4 and E-5 soldiers. The difference between the student class and the population is only a matter of .40 years, or 1.67% of the population value. It appears that the student class was only slightly older than the entire population of E-4's and E-5's, and were again quite representative of the population from which future classes will be drawn.

For time in military service the student class appeared to be slightly over represented as compared to the population. On the average students had approximately one more year of service than the E-4 and E-5 population. This difference is not of concern however, since both the E-4 and E-5 population and the student classes would be expected to be "careerists" in their second term of enlistment. The fact that the student class' age was at the population value while the time in service was about one year above the population value indicates that the members of the student class had enlisted in the Army a bit earlier that the average E-4 or E-5 in the population.

Overall these results provide evidence that the 91B30 student class was representative of theE-4 and E-5 91B population in terms of equivalent grade level, age, and time in service. THEREFORE IT MAY BE CONCLUDED THAT THE FIRST SELECTED STUDENT CLASS IS REPRESENTATIVE OF THE FULL RANGE OF TALENT IN THE 91B E-4 AND E-5 POPULATION, AND THAT THE VALIDATION OF 91B30 COURSE MATERIALS IS APPROPRIATE FOR THE FUTURE 91B30 CLASSES WHICH WILL ENTER IN THE FUTURE.

With regard to gender representation, the first selected student class contained 8 females or 18.18% as compared to the population percent of 16.29. Since the initial class selection, several substitutions have occurred due to student availability and administrative actions. One student selectee did not have enough time-left-in-service for completion of the course and was removed from the class leaving 39 students who started the course. Of the

39 students remaining, 4 were female or some 10.26%, some 6% less than the population value. The educational literature is very clear regarding male versus female academic ability, in that females tend to do slightly better than males in educational achievement settings. With slightly fewer females in the validation class, course grades would be expected to be slightly lower than a fully representative class containing 16% females. However, this is a minor concern when viewed from the perspective of student selection (see Study 1 above) which indicated that Army experience and leadership variables were the chief concern for course selection. As a matter of fact, slight under-representation of females in the validation class would increase to some small extent the number of males who would marginally pass the course training requirements.

CONCLUSIONS

Two studies were conducted to examine the extent to which student selection for the 91B30 course was equitable and the extent to which the first selected student class was representative of future 91B30 classes. Results from these two studies indicated that student selection was based upon Army assignments and leadership experiences, and <u>not</u> based upon gender, civilian education, nor previous EMT training. Further, the 91B30 student class was shown to be representative of the existing 91B E-4 and E-5 population. These findings may be interpreted as providing evidence for a defensible and properly aligned validation for the 91B30 Advanced Medical Specialist course developed by the Academy of Health Sciences.

References

Guilford, J. P., & Fruchter, B. Fundamental statistics in psychology and education (5th ed.). New York: McGraw-Hill, 1972.

Kerlinger, F., & Pedhazur, E. J. Multiple regression in behavioral research. New York: Holt, Rinehart, & Winston, 1973.

Soldier Support Center. Enlisted Master File "MOS Profiles" - Data For MOS 91B - Medical Specialist. Ft. Benjamin Harrison, IN, 8 July 1982.

Ward, J., & Jennings, E. Introduction to linear models. Englewood Cliffs, N.J.: Prentice Hall, 1972.

APPENDIX I.
91B30 Applicant Pool and Selection Recommendations

Sixty-one applications were examined from 21 separate organizational units ranging from 10 (Ft. Bragg) and 8 (Ft. Ord) applications to single submissions from locations such as Panama and Ft. Riley. Of the 61 applications examined, 14 were from females (22.95%).

Five criteria were employed to assign scores to each of the applicants. The criteria are presented in the following table along with the score points associated with each of the experience factors.

Table 1

Application Scoring Criteria

Criterion	Points Attainable 1	2	3
Emergency Medical Technician Training/Certification	EMT Certification	EMT-A	EMT-P
TOE Unit Assignments	FORSCOM	OCONUS	RDF
TDA Assignments	Other	TMC/DISP	ER/Ambulance
Civilian Education	1-2 years or Associate Degree	Bachelor Degree	Masters Degree
Leadership Training	Other	PLC	BNCOC/ANCOC

Three of the applications were incomplete and lacked EMT, civilian education, leadership, and unit assignment history information. Points were assigned to these applications based on current assignment data.

Analyses of the criterion scores assigned indicated that 13 or 21.31% of the applicants had some form of EMT training. For assignments, 8 persons had served in TOE units only, 5 had served exclusively in TDA units, while 45 or 73.77% of the applicants had served with both types of units.

In terms of civilian education, one applicant had not completed high school (H.S.), and 4 others had G.E.D. certificates. This represented 8.62% of the 58 applicants with known educational attainment. Nine of the 58 or 15.52% had completed some college work beyond high school, and 3 had achieved an Associate degree. The remaining 44 applicants were high school graduates representing 75.86% of the 58 applicants. Over one-half of the 58 had completed some form of leadership training (31/58 = 53.45%).

Applicant composite scores were computed by summing the number of points from each of the five criteria. Composite scores ranged from a score of 1 to a high of 10 points out of a possible 15 maximum points. Figure 1 displays the distribution of all applicant scores. The distribution appears

Frequency of Composite Scores

Score	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	X	X												2
2	X	X	X	X	X									5
3	X	X	X	X	X	X	X	X	X					9
4	X	X	X	X	X	X	X	X	X	X	X	X		12
5	X	X	X	X	X	X	X	X	X	X				10
6	X	X	X	X	X	X	X	X	X	X	X			11
7	X	X	X	X	X	X								6
8	X	X	X											3
9	X	X												2
10	X													1
11														
12														
13														
14														
15														

Total = 61

Figure 1. Distribution of Applicant Composite Scores

to be skewed slightly to the lower end of the possible range of scores. The average composite score was 4.86 with a standard deviation of 1.99 score points. The distribution appears to be fairly normal and based upon the five criteria employed, applicants could be readily grouped into three stratified groups consisting of 1) scores from 1 to 3 (n=16), 2) scores from 4 to 5 (n=22), and 3) scores of 6 and above (n=23). Selection by stratified subgroup would ensure an equitable representation of talent for entry into the 91B30 course both for

course validation of materials and tests, and for an equal opportunity of selection from the full range of applications received. The breakdown of selected applicants based upon the initial distribution of composite scores is shown in Table 2 below. In addition, the consideration of male/female

Table 2

Composite Score Range	Possible Selection Ratios: Applicant Pool N	Strata %	Selectees for Class size=40	Number of females/males per subgroup (N=61) F	M
0 to 3	16	26.23	11	5	11
4 to 5	22	36.07	14	8	14
6 & above	23	37.70	15	1	22
	61		40	14	47

ratios could be incorporated into the selection design also. Column 5 indicates the number of female applicants within each stratified subgroup. and their male counter parts. However, quota selection on the basis of gender is a perogative of Academy management and should take into account Army policy pertaining to women in combat issues and sustainment of viable training at TDA sites. Women comprise approximately 10% of the 91B medical specialist MOS.

Position Paper
Prepared 15 Nov 82
Individual Training Division

APPENDIX II.

HSHA-TIA 22 November 1982

MEMORANDUM FOR RECORD

SUBJECT: 91B30 Pilot Class #1 Student Selection

1. On 15 Nov 82 at 0730 hrs, the following individuals met in the office of the Academy CSM to select 91B30 Pilot Course students:

CSM R. M	Academy Bde
SGM D. B	AMEDDPERSA Ed & Tng
SGM E. W	MSD
MSG E. J	AMEDDPERSA Ed & Tng
SFC M. D	MILPERCEN
CPT T. C	EDB, Ex Officio

2. Sixty one applications were on hand to fill 40 slots (plus 4 alternates) in the Mar 83 large group iteration of the new course. MSG J served as recorder. The following procedures were delineated:

a. Students would be rated on a scale of 0 to 5

b. Each board member would rate each applicant such that 5 scores would be derived.

c. Scores would be totaled and a mean score derived for each applicant.

d. Scores would then be arrayed and a representative sample, including top, middle, and lower portions would be secured.

e. Standard DA selection criteria would be employed.

f. The applicants without completed applications, including DA Form 2 and 2.1 would not be considered.

3. The process of validation was then discussed by CPT C 91B30 Project Officer, and the necessity of a representative population sample in the Pilot courses was presented.

4. The array of students in the selection process (subjective domain) was subsequently compared to the weighted criteria (objective domain) outlined in Inclosure #1, and an overall impression of the group was determined.

HSHA-TIA 22 November 1982
SUBJECT: 91B30 Pilot Class #1 Student Selection

5. Board selection values for the 44 total students selected are presented at Table 1.

Table 1

Selection Board's Distribution of Rated Values

Rating	N
Above 3.5	12
2.5 - 3.4	19
0 - 2.4	13
Total	44 (8 females)

6. Applicants not selected for Pilot Class #1 will automatically be considered for Pilot Class #2. AMEDDPERSA will send out messages soliciting applicants for Pilot class #2.

7. Pilot Class II will be selected in Jan 83, utilizing, if possible, the same members of this board, thus insuring continuity.

8. The roster of students selected (Incl #2) was formulated and the responsibility for student notification was given to SFC D MILPERCEN.

2 Incl
as

TERRY D. CARROLL
CPT, MSC
Project Officer

Inclosure #1

Intersection of the objective and subjective domains in pilot course student selection is presented at Table 1.

TABLE 1

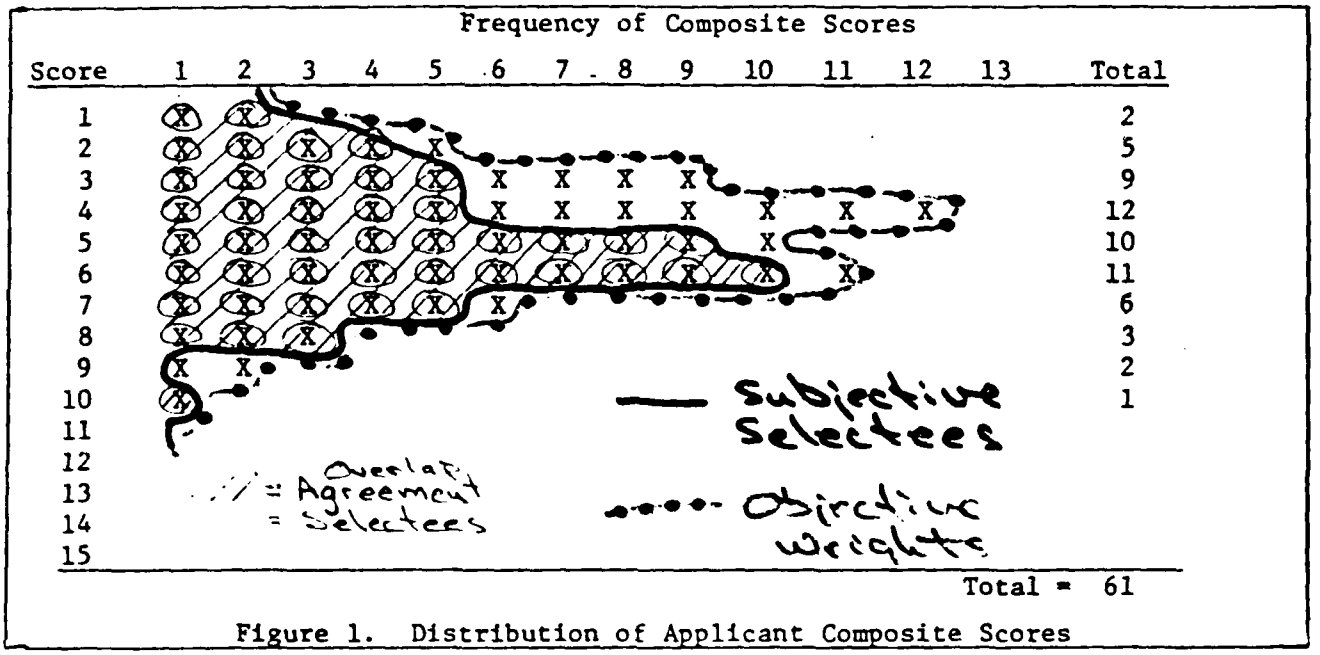

Figure 1. Distribution of Applicant Composite Scores

1. The imposition of the well distributed Board selectees over the equally well distributed representation of the weighted criteria described in Appendix #1 presents the students selected in both domains, thus enabling EDB to obtain a sample for large group validation

2. The domains were arrayed independently, and data was merged after all weights/rates were established. Selection Board members were not made aware of the weighted criteria results.

91B30 Pilot Class #1
Student Roster
Inclosure # 2

Name	Rank	SSN	Unit
REMOVED DUE TO PRIVACY ACT	SGT/E5	REMOVED DUE TO PRIVACY ACT	B CO WRAMC Washington, DC
	SP4/E4		47th Field Hospital Fort Sill, OK
	SP4/E4		DDEAMC Fort Gordon, GA
	SP5/E5		546th Medical Company Fort Benning, GA
	SP5/E5		USAMEDDAC Fort Belvoir, VA
	SP5/E5		47th Field Hospital Fort Sill, OK
	SP4/E4		Med CO A LAMC PSF, CA
	SP4/E4		CO A 307th Med Bn (ABN) Fort Bragg, NC
	SP5/E5		Med CO USA MEDDAC Fort Carson, CO
	SP5/E5		CO B BAMC FSH, TX
	SP4/E4		CO B FAMC Aurora, CO
	SP5/E5		HSC 307th Med Bn (ABN) Fort Bragg, NC
	SP5/E5		HSC 307th Med Bn (ABN) Fort Bragg, NC
	SP4/E4		HSC 307th Med Bn (ABN) Fort Bragg, NC
	SP4/E4		CO B 7th Med Bn Fort Ord, CA
	SGT/E5		46th CSH Fort Devens, MA

91B30 Pilot Class #1
Student Roster
Mar 83

Name	Rank	SSN	Unit
REMOVED DUE TO PRIVACY ACT	SP4/E4	-	B CO 1st Med Bn Fort Riley, KS
	SP4/E4	-	A CO 7th Med Bn Fort Ord, CA
	SP5/E5	-	47th Field Hospital Fort Sill, OK
	SP5/E5	-	A CO 307th Med Bn (ABN) Fort Bragg, NC
	SP5/E5	-	546th Med CO Fort Benning, GA
	SP4/E4	-	B CO 7th Med Bn Fort Ord, CA
	SP5/E5	-	HSC 7th Med Bn Fort Ord, CA
	SP4/E4	-	A CO 307th Med Bn (ABN) Fort Bragg, NC
	SP5/E5	-	B CO 307th Med Bn (ABN) Fort Bragg, NC
	SP5/E5	-	C CO 307th Med Bn (ABN) Fort Bragg, NC
	SP5/E5	-	85th CSH Fort Lee, VA
	SP4/E4	-	HSC 7th Med Bn Fort Ord, CA
	SP5/E5	-	HSC 7th Med Bn Fort Ord, CA
	SGT/E5	-	HSC 7th Med Bn Fort Ord, CA
	SP5/E5	-	546th Med CO Fort Benning, GA
	SP5/E5	-	DDEAMC Fort Gordon, GA

REMOVED DUE TO PRIVACY ACT

91B30 Pilot Class #1
Student Roster
Mar 83

Name	Rank	SSN	Unit
	SP5/E5		47th Field Hospital Fort Sill, OK
	SP5/E5		CO A WBAMC El Paso, TX
	SP5/E5		11th Med CO Fort Hood, TX
	SP5/E5		47th Field Hospital Fort Sill, OK
	SP5/E5		5th MASH Fort Bragg, NC
	SP5/E5		11th Med CO Fort Hood, TX
	SP5/E5		Med CO MEDDAC Fort Belvoir, VA
	SP5/E5		MEDDAC Fort Belvoir, VA
			Med Co 86th CSH Fort Campbell, KY
			47th Field Hospital Fort Sill, OK
			85th CSH Fort Lee, VA
			Co C WRAMC Washington, DC

REMOVED DUE TO PRIVACY ACT

REMOVED DUE TO PRIVACY ACT

DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
HSA-BB-T	Results of TABE and SelectABLE Testing

TO: Project NCO
91B30 Team
ATTN: SFC Hague

FROM: Army Education Center
HQS, 1st BN, AHS
Bldg. 902

DATE: 15 Mar 83

CMT 1

M. Perez/jl/4496

1. References:

a. AR 621-5

b. AHS Policy Number 82-1, Subject: Referral to the Basic Skills Education Program (BSEP).

2. On 14 Mar 83, this office administered the Test of Adult Basic Education (TABE) and the SelectABLE to 40 Service Members (SM) in the 91B30 course.

3. The TABE is used to determine the grade equivalent skill levels in Reading, Language, Spelling and Mathematics. The possible range of scores is from 5.0 (fifth grade) to 12.9 (twelfth grade, ninth month). IAW reference a. above, SM who score below 9.0 on the Reading, Language or Mathematics portion of the TABE are normally eligible for the Basic Skills Education Program.

4. Nonetheless, any student requiring tutorial assistance for prerequisite competencies to successfully complete AIT at AHS may be referred to BSEP for instruction.

5. The TABE results of the 40 SM tested are shown at inclosure 1. The following test analyses are made:

a. Of the 40 SM tested, 34 SM (85%) scored above 9.0 on TABE Reading.

b. Of the 40 SM tested, 6 SM (15%) scored below 9.0 on TABE Reading.

c. Of the 40 SM tested, 19 SM (48%) scored above 9.0 on TABE Math.

d. Of the 40 SM tested, 21 SM (52%) scored below 9.0 on TABE Math.

e. Of the 40 SM tested, 25 SM (63%) scored above 9.0 on TABE Language.

f. Of the 40 SM tested, 15 SM (37%) scored below 9.0 on TABE Language.

6. This Education Center welcomes any inquiries regarding these test results, the BSEP program, and future testing needs.

MICHAEL A. PEREZ
DAC
Education Services Specialist

Inclosure 1 - Name and SSAN removed

Test Scores, Ages, and Time in Service

Student	Grade Equiv. Skill Level	Age	Time in Service
1	7.0	22	5
2	10.1	32	6
3	12.9	23	4
4	11.5	23	4
5	10.1	30	10
6	8.5	28	7
7	8.5	30	4
8	12.0	22	4
9	12.9	26	6
10	12.9	26	7
11	8.3	24	5
12	10.2	22	3
13	10.5	27	5
14	12.9	21	3
15	9.7	23	3
16	12.9	29	5
17	8.4	26	9
18	9.1	24	7
19	8.1	32	3
20	7.6	29	3
21	10.9	22	4
22	10.5	24	4
23	7.2	24	6
24	11.5	23	6
25	9.8	21	5
26	12.9	22	5
27	10.4	22	5
28	8.8	22	2
29	10.4	30	4
30	6.8	27	8
31	11.7	32	10
32	7.3	23	5
33	7.8	29	10
34	11.4	23	5
35	8.2	24	5
36	7.8	27	8
37	10.2	23	4
38	11.0	24	6
39	9.4	24	5
40	12.0	23	6
Sum of X's	=400.1	994	226
N	40	40	40
Mean	= 10.0025	24.85	5.65
Std. Dev_N	= 1.87	3.3132	2.116
Std. Dev_{n-1}	= 1.89	3.3554	2.143